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S190 INTERPRETATION TECHNIQUES DEVELOPMENT AND APPLICATION TO NEW YORK STATE WATER RESOURCES

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The objective of this investigation is development of interpretation techniques for satellite monitoring of lake eutrophication. Imagery from the S190A and S190B experiments is to be utilized to study eutrophication processes in lakes of importance to New York State water resources.

During the reporting period, an interim program report was prepared and submitted to NASA[+]. The report summarized the research and conclusions of the investigation to date. The conclusions of the report were as follows:

> The most useful optical parameter for remote sensing analyses of lakes is the relative value of the blue and green reflectances of the lake. Variations in the ratio of blue to green lake reflectance can be correlated with variations of important optical and biological parameters measured from surface vessels. Determinations of the ratio of blue to green lake reflectance from the S190A color imagery are in excellent agreement with values obtained from small scale color imagery from aircraft, and the accuracy of the satellite values is within the accuracy required for extrapolation of satellite data to surface optical data. The satellite data have a significant advantage over the aircraft imagery in the ability to depict surface patterns within a large lake and in the ability to compare a number of smaller lakes on the same frame of imagery.
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> The prime characteristic of the S190 imagery which is responsible for the measurement accuracy is the resolution capability of the experiment. The two most desirable refinements to the S190 experiment would be increases spatial resolution and repetitive coverage on a regular basis. The increase in resolution would

[+]S190 Interpretation Techniques Development and Application to New York State Water Resources, EREP No. 391, Contract No. NAS9-13336, Calspan Corporation Report No. YB-5298-M-1, 15 June 1974.

permit more accurate data processing under more complicated atmospheric conditions. Regular overflights would add the important aspect of temporal information to the water quality analyses.

Data reduction on the 9 September 1973 imagery of Lake Ontario was completed and is reported on in the interim report. Imagery of the Finger Lakes region of New York State from 10 September 1973 has been obtained. The imagery is of good quality, and reduction of data from this imagery is now complete. Analyses relating the data to lake parameters have begun.

S190 imagery, from 19 September 1973, of Onondaga Lake near Syracuse, New York, has also been obtained. Onondaga Lake differs greatly in character from the lakes previously studied on our program, and hence the imagery is of great interest. The lake is only 4.5 square miles (11 sq km) in area, and receives drainage and waste waters from over 200 square miles (600 sq km) including about 150 industrial operations. The lake is eutrophic and has a Secchi disk transparency of about 1 meter (as compared to ~4 meters for Lake Ontario and ~5 meters for Conesus Lake). At present recreational use is confined to picnicking along the shores of the lake.

Excellent aircraft imagery of Onondaga has been located, although the imagery is not concurrent with the satellite pass. It appears possible to utilize our shadow calibration analyses on the S190B imagery of Onondaga, as shadows from large buildings in and around Syracuse appear resolvable on the imagery. The shadow analyses should be completed within the next reporting period, as well as the remaining elements of the data reduction for the set of imagery of Onondaga Lake.